

What is claimed is:

1. A semiconductor device comprising:
a substrate;
a first thin film transistor having a first active layer including $\text{Si}_{1-x}\text{Ge}_x$ where $0 < x < 1$ formed over said substrate; and

a second thin film transistor having a second active layer including silicon formed over said substrate.

2. A semiconductor device comprising:

a substrate;

a first thin film transistor having a first active layer including $\text{Si}_{1-x}\text{Ge}_x$ where $0 < x < 1$ formed over said substrate; and

a second thin film transistor having a second active layer including silicon formed over said substrate,

wherein said first thin film transistor constitutes a CMOS circuit.

3. A semiconductor device comprising:

a substrate;

a first thin film transistor having a first active layer including $\text{Si}_{1-x}\text{Ge}_x$ where $0 < x < 1$; and

a second thin film transistor having a second active layer including silicon,

wherein said first thin film transistor constitutes a driver circuit and said second thin film transistor constitutes a pixel matrix circuit.

4. A semiconductor device according to claim 1, wherein said $\text{Si}_{1-x}\text{Ge}_x$ is polycrystalline silicon germanium and said silicon is polysilicon.

5. A semiconductor device according to claim 2, wherein said $\text{Si}_{1-x}\text{Ge}_x$ is polycrystalline silicon germanium and said

silicon is polysilicon.

6. A semiconductor device according to claim 3, wherein said $\text{Si}_{1-x}\text{Ge}_x$ is polycrystalline silicon germanium and said silicon is polysilicon. B

5 7. A semiconductor device according to claim 1, wherein said $\text{Si}_{1-x}\text{Ge}_x$ is polycrystalline silicon germanium and said silicon is amorphous silicon.

10 8. A semiconductor device according to claim 2, wherein said $\text{Si}_{1-x}\text{Ge}_x$ is polycrystalline silicon germanium and said silicon is amorphous silicon.

9. A semiconductor device according to claim 3, wherein said $\text{Si}_{1-x}\text{Ge}_x$ is polycrystalline silicon germanium and said silicon is amorphous silicon. B

15 10. A semiconductor device according to claim 1, wherein said first active layer further includes nickel at a concentration of 1×10^{15} to 1×10^{16} atoms/cm³.

11. A semiconductor device according to claim 2, wherein said first active layer further includes nickel at a concentration of 1×10^{15} to 1×10^{16} atoms/cm³.

20 12. A semiconductor device according to claim 3, wherein said first active layer further includes nickel at a concentration of 1×10^{15} to 1×10^{16} atoms/cm³. B

25 13. A semiconductor device according to claim 1 wherein said semiconductor device is for use in one of a handy phone, a video camera, a mobile computer, a head-mount display, a rear-type projector and a front-type projector.

30 14. A semiconductor device according to claim 2 wherein said semiconductor device is for use in one of a handy phone, a video camera, a mobile computer, a head-mount display, a rear-type projector and a front-type projector.

15. A semiconductor device according to claim 3 wherein

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Q2

said semiconductor device is for use in one of a handy phone, a video camera, a mobile computer, a head-mount display, a rear-type projector and a front-type projector.

5 16. A method for manufacturing a semiconductor device, comprising:

a step of forming an amorphous silicon film on a substrate having an insulating surface;

a step of adding germanium to a part of said amorphous silicon film;

10 a step of adding an element to said amorphous silicon film to promote crystallization of said amorphous silicon film; and

a step of crystallizing said amorphous silicon film by heat treatment.

15 17. A method for manufacturing a semiconductor device, comprising:

a step of forming an amorphous silicon film on a substrate having an insulating surface;

20 a step of adding germanium to a part of said amorphous silicon film;

a step of forming a film comprising an element on a surface of said amorphous silicon film to promote crystallization of said amorphous silicon film; and

25 a step of crystallizing said amorphous silicon film by heat treatment.

18. A method for manufacturing a semiconductor device, comprising:

a step of forming an amorphous silicon film on a substrate having an insulating surface;

30 a step of forming a germanium film in contact with a part of said amorphous silicon film;

a step of adding an element to said amorphous silicon

film to promote crystallization of said amorphous silicon film; and

a step of crystallizing said amorphous silicon film by heat treatment.

5 19. A method for manufacturing a semiconductor device, comprising:

a step of forming an amorphous silicon film on a substrate having an insulating surface;

10 a step of forming a germanium film in contact with a part of said amorphous silicon film;

a step of forming a film comprising an element on a surface of said amorphous silicon film to promote crystallization of said amorphous silicon film; and

15 a step of crystallizing said amorphous silicon film by heat treatment.

20 20. A method for forming a semiconductor device according to claim 16, wherein said element is one or more elements selected from the group consisting of nickel, cobalt, iron, copper, palladium, platinum, gold and indium.

21. A method for forming a semiconductor device according to claim 17, wherein said element is one or more elements selected from the group consisting of nickel, cobalt, iron, copper, palladium, platinum, gold and indium.

25 22. A method for forming a semiconductor device according to claim 18, wherein said element is one or more elements selected from the group consisting of nickel, cobalt, iron, copper, palladium, platinum, gold and indium.

30 23. A method for forming a semiconductor device according to claim 19, wherein said element is one or more elements selected from the group consisting of nickel, cobalt, iron, copper, palladium, platinum, gold and indium.

24. A method for forming a semiconductor device

according to claim 16, wherein said heat treatment is carried out in a temperature range of from 550 to 650 °C.

25. A method for forming a semiconductor device according to claim 17, wherein said heat treatment is carried out in a temperature range of from 550 to 650 °C.

26. A method for forming a semiconductor device according to claim 18, wherein said heat treatment is carried out in a temperature range of from 550 to 650 °C.

27. A method for forming a semiconductor device according to claim 19, wherein said heat treatment is carried out in a temperature range of from 550 to 650 °C.

28. A method for manufacturing a semiconductor device, comprising:

a step of forming an amorphous silicon film on a substrate having an insulating surface;

a step of forming an insulating film on a part of said amorphous silicon film;

a step of covering said amorphous silicon film and said insulation film to form a germanium film; and

a step of crystallizing said amorphous silicon film at a portion at least in contact with said germanium film by heat treatment.

29. A method for forming a semiconductor device according to claim 28, wherein said heat treatment is carried out in a temperature range of from 500 to 550 °C.

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Add B5

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Add D3
Add E7